Use of Functional Strengthening, Balance Training, and Stretching In The Treatment Of A Patient Following a T11-L5 Spinal Fusion: A Case Report

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Purpose

• Describe the management and functional improvement of a patient s/p spinal fusion with:
  • Severe postural impairments
  • Elevated fall risk
  • High levels of low back pain

Foundation

• Lumbar spinal fusion surgery is utilized to manage LBP and instability
• Pain often persists post-operatively
• Age-related hyperkyphosis may contribute to ADL difficulty, quality of life, and mortality rates
• Evidence supports use of Transverse Abdominis recruitment and hip strengthening exercises in patients with LBP

Patient Description

Examination

History

• 68 year-old male 8 weeks s/p T11-L5 spinal fusion
• COPD, smoked 2 packs per day
• Patient did not exercise pre-operatively
• Used rolling walker in community for 1 year pre-operatively
• No assistive device use at home
• Patient goals for PT: stand up straighter, return to work as guitar teacher

Subjective/Objective

• NPRS
• ODI
• BBS
• DGI
• Posture
• Gross LE strength
• Functional strength assessment
• Palpation
• Gait

Interventions

Strengthening

• TA recruitment
• Clamshells
• Sid. hip abd/ext.
• Lateral walks
• SITs
• Step ups
• Bridging
• Posterior pelvic tilt
• Rows
• Shoulder ext.
• Shoulder ER
• Chin tens
• Chicken wings
• Angles

Stretching

• Manual and self hamstring
• Manual and self hip flexors
• Self pectorals
• Self quadriceps
• Three-point gait training
• Manual perturbations reaching out of BOS at parallel bars
• Alternating toe taps on step
• Tandem and SLS in parallel bars
• M/L and A/P weight shift and mae control on Bodek

Balance Training

• Three-point gait training
• Manual perturbations reaching out of BOS at parallel bars
• Alternating toe taps on step

Outcomes

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Initial Evaluation</th>
<th>Final Visit</th>
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</thead>
<tbody>
<tr>
<td>NPRS IE to Final</td>
<td>At Initial</td>
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<tr>
<td>ODI IE to Final Visit</td>
<td>At Initial</td>
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<td>BBS and DGI IE to Final Visit</td>
<td>At Initial</td>
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<tr>
<td>BBS</td>
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<tr>
<td>DGI</td>
<td>At Initial</td>
<td>At Final</td>
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</tbody>
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Posture

• Marked flexed trunk (~45 degrees)
• Rounded shoulders
• Forward head
• Moderate flexed trunk (~15 degrees)
• Upright retraction
• Upright shoulders/forward head

Functional strength assessment

• Fair eccentric quadriceps control
• Slow initiation of SITs
• ~30 degrees hip ER side stepping
• Good eccentric quadriceps control
• Fewer attempts to achieve a full standing position during SITs ~15 degrees hip ER during functional side stepping

MMT

• Iliopsoas 4/5
• Quadriceps 4/5
• Hamstrings 4/5
• Hip ER 4/5
• Hip abductors 3/5 L 3/5 R
• Iliopsoas 4/5
• Quadriceps 4/5
• Hamstrings 4/5
• Hip ER 4/5
• Hip abductors 4/5
• Scapular retractors/depressions 4/5

Muscle length

• Severe iliopsoas restrictions
• 90/90 hamstrings 40 degrees from 0
• Moderate iliopsoas restrictions
• 90/90 hamstrings 20 degrees from 0

The photos above demonstrate the patient’s improvement in forward flexed posture at the final visit.

Discussion

• Lower extremity strengthening, stretching, and balance training may be beneficial treatment approaches
• Cigarette smoking may inhibit spinal fusion and adversely affect outcomes, including return to work

Limitations

• Cannot infer cause and effect between these interventions and clinical improvement of the patient
• The functional improvements and decreased forward flexed posture suggest these interventions were likely a contributing factor
• Further research is warranted

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References